

REMARKS

By this amendment, claims 1, 4-8 and 13-14 have been amended. New claims 15 and 16 have been added. Claims 1-16 remain in the application. This application has been carefully considered in connection with the Examiner's Action. Reconsideration, and allowance of the application, as amended, is requested.

Rejection under 35 U.S.C. §101

Claim 13 stands rejected under 35 U.S.C. §101 as not falling within one of the four statutory categories of invention. As presented herein, claim 13 has been amended, in part, to recite that the method is carried out via an image processing system, receiving is via an input of the image processing system, and the creating is via a video processor of the image processing system. Accordingly, claim 13 is now believed directed to statutory subject matter. Withdrawal of the rejection is respectfully requested.

Claim 14 stands rejected under 35 U.S.C. §101 as not falling within one of the four statutory categories of invention. As presented herein, claim 14 has been amended, in part, to recite a computer readable media encoded with a computer program ..., and thus now renders the same as being directed to statutory subject matter. Rejection of the claim is now believed to be overcome.

Rejection under 35 U.S.C. §112

Claims 5-8 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As presented herein, claim 5 has been amended to more clearly articulate that the pixel selection means sequentially selects input pixels per row by selecting (a) a hidden image pixel for (a)(1) pixel positions in a de-occluded area; (a)(2) pixel positions defined by a first number of pixel positions before the de-

occluded area; and (a)(3) pixel positions defined by a second number of pixel positions after the de-occluded area; and (b) transformed input pixels for other pixel positions on the display line. Claim 4, from which claim 5 depends, includes the limitation that the video processor is operative to sequentially process input pixels per row of corresponding pixel arrays of the input image and the hidden image. Support for the amendment to claims 4 and 5 can be found in the specification, at least on page 12, line 13 to page 13, line 5; and in FIG. 10. In addition, each of claims 5-8 have been amended, in part, to recite "one selected from the group consisting of (i) the first number, (ii) the second number, and (iii) both the first number and the second number" and the phrase "and/or" as originally presented has been removed. Thus, claims 5-8 are believed to no longer be indefinite. Withdrawal of the rejection is respectfully requested.

Rejection under 35 U.S.C. §103

Claim 1:

Claim 1 recites an image processing system for generating at least one output image associated with an output viewpoint from an input image associated with an input viewpoint through a depth-dependent transformation; the images being represented as an input pixel array and an output pixel array, respectively; the image processing system comprising:

- an input for receiving (i) the input image and (ii) a hidden image, the input image (i)(a) being a pre-filtered 2D representation of 3D objects as seen from the input viewpoint, and (i)(b) comprising for each input pixel an associated input pixel value and an associated input pixel depth, the hidden image (ii)(a) being another 2D representation of the 3D objects and (ii)(b) comprising information, for each hidden image pixel an associated hidden image pixel value and an associated hidden image pixel depth, which information is at least partly occluded from the input viewpoint;
- a video processor being operative to create output pixels of the output

image by:

- transforming each input pixel of the input image to a transformed input pixel, associated with the output viewpoint, as a function of the input pixel depth, and
- creating the output image based on the transformed input pixels of the input image, using (iii) hidden image pixels (iii)(a) for filling de-occluded areas of the transformed input pixels of the input image and (iii)(b) for filling at least one pixel position adjacent to the de-occluded areas of the transformed input pixels of the input image (iii)(c) to create enlarged de-occluded areas filled with pixels of the hidden image for preventing ghost line artifacts, caused by transformation of the pre-filtered input image; and
- an output for providing the output image for subsequent rendering.

Support for amendment to claim 1 (as well as for amendment to claim 13 and 14) can be found in the specification at least on page 3, line 29-34; page 4, lines 13-14; page 10, lines 27-31; and FIG. 10.

As presented, claim 1 clearly articulates a novel and non-obvious image processing system which advantageously prevents ghost line artifacts near the de-occluded hidden image pixels by rendering a larger part of the hidden layer for replacing transformed input pixels adjacent to the de-occluded parts of the hidden layer. The hidden image pixels in the *larger part* of the hidden layer are inserted into the output image instead of the corresponding transformed input pixels. (See, for example, the present specification on page 3, lines 29-34). In the system of the present application, *not only* the pixel positions in the de-occluded area are filled with pixels from the hidden image, *but also* one or more pixels adjacent to the de-occluded area are filled with pixels taken from the hidden image. As a consequence, an enlarged de-occluded area

is created and the pixels with color from both the foreground and the background (which formed the ghost line artifacts) are not part of the output image anymore. (See, for example, the present specification on page 10, lines 27-31).

Claims 1-5 and 12-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Meijers (U.S. Patent 5,929,859; hereafter "**Meijers**") in view of Simpson et al. (U.S. Patent 6,466,205; hereafter "**Simpson**"). With respect to claim 1, Applicant respectfully traverses this rejection on the grounds that the references are defective in establishing a prima facie case of obviousness.

As the PTO recognizes in MPEP § 2142:

... The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness ...

It is submitted that, in the present case, the examiner has not factually supported a prima facie case of obviousness for at least the following reasons.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

The **Meijers** and **Simpson** references cannot be applied to reject claim 1 under 35 U.S.C. §103 which provides that:

A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ... (Emphasis added)

Thus, when evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, since neither **Meijers** nor **Simpson** teaches an image processing system for generating at least one output image associated with an output viewpoint from an input image associated with an input viewpoint ... featuring "an

input for receiving (i) the input image and (ii) a hidden image ... a video processor being operative ... by *transforming* each input pixel of the input image to a transformed input pixel ... *and creating* the output image *based on* the transformed input pixels of the input image, *using* (iii) hidden image pixels (iii)(a) *for filling* de-occluded areas of the transformed input pixels of the input image *and* (iii)(b) *for filling* at least one pixel position adjacent to the de-occluded areas of the transformed input pixels of the input image (iii)(c) to create enlarged de-occluded areas filled with pixels of the hidden image for preventing ghost line artifacts" (emphasis added) as is claimed in claim 1, it is impossible to render the subject matter of claim 1 as a whole obvious, and the explicit terms of the statute cannot be met.

In contrast, the **Meijers** reference is directed to parallaxic depth-dependent pixel shifts and the creation of an output image through a parallaxic transformation of an input image (See Meijers abstract). However, the **Meijers** reference does not teach or suggest "receiving (i) the input image and (ii) a hidden image ... a video processor being operative ... by *transforming* each input pixel of the input image to a transformed input pixel ... *and creating* the output image *based on* the transformed input pixels of the input image, *using* (iii) hidden image pixels (iii)(a) *for filling* de-occluded areas of the transformed input pixels of the input image *and* (iii)(b) *for filling* at least one pixel position adjacent to the de-occluded areas of the transformed input pixels of the input image (iii)(c) to create enlarged de-occluded areas filled with pixels of the hidden image for preventing ghost line artifacts" as recited in claim 1.

In further contrast, the **Simpson** reference is directed to a system and method for creating 3D models from 2D sequential image data in which an image having enhanced three-dimensional attributes from a source image having only two-dimensional spatial domain information is generated. Object image discrimination is obtained using machine vision techniques to *identify objects* within the source image. Thereafter, object images are *dissected* into *image cells* wherein the *object images* are supplemented to include missing information. The *image cells* are *reassembled* into the

image having the desired enhanced three-dimensional attributes. (See Simpson abstract). “[I]n *interpolated information* is used to fill in the information “missing” when each object of the visual image is separated away from the whole.” (See Simpson, col. 3, lines 44-46). The system of **Simpson** produces “a new image including object shadowing from a heretofore *nonexistent* light source.” (See Simpson, col. 3, lines 59-60). In addition, “information is extracted from the source image” and “utilized to manipulate the image in order to produce a resulting image representation including information beyond that directly available from the source image.” (See Simpson, col. 4, lines 5-8). Furthermore, **Simpson** at col. 6, lines 51-52, discloses “some spatial edge cleanup may be employed (as shown in step 806).” Moreover, in FIG. 8 of **Simpson**, box 806 contains “CLEAN UP EDGES OF FILLED REGIONS TO SMOOTH WITH KNOWN DATA.” However, the **Simpson** reference does not teach or suggest “receiving (i) the input image and (ii) a hidden image ... a video processor being operative ... by *transforming* each input pixel of the input image to a transformed input pixel ... *and creating* the output image *based on* the transformed input pixels of the input image, *using* (iii) hidden image pixels (iii)(a) *for filling* de-occluded areas of the transformed input pixels of the input image *and* (iii)(b) *for filling* at least one pixel position adjacent to the de-occluded areas of the transformed input pixels of the input image (iii)(c) to create enlarged de-occluded areas filled with pixels of the hidden image for preventing ghost line artifacts” as recited in claim 1.

For this reason, the examiner’s burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

2. Prior Art That Teaches Away From the Claimed Invention Cannot be Used to Establish Obviousness

In the present case, the **Simpson** reference, by providing that the “stereoscopic three-dimensional vision accomplished ... is derived from a single two-dimensional

source image ..." (see Simpson at column 12, lines 6-9), is directed to a method in which a single source image is used. Accordingly, the stereoscopic three-dimensional vision of **Simpson** is not derived from both a received input image and corresponding received hidden image. Thus, the system of **Simpson** clearly teaches away from claim 1, recited above.

Since it is well recognized that teaching away from the claimed invention is a *per se* demonstration of lack of *prima facie* obviousness, it is clear that the examiner has not borne the initial burden of factually supporting any *prima facie* conclusion of obviousness.

Thus, for this reason alone, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

3. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness does not apply (which is clearly not the case based on the above), there is still another compelling reason why the **Meijers** and **Simpson** references cannot be applied to reject claim 1 under 35 U.S.C. §103.

§ 2142 of the MPEP also provides:

...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made.....The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.

Here, neither **Meijers** nor **Simpson** teaches, or even suggests, the desirability of the combination since no one of the references teach an image processing system for generating at least one output image associated with an output viewpoint from an input image associated with an input viewpoint ... featuring "an input for receiving (i) the input image and (ii) a hidden image ... a video processor being operative ... by *transforming*

each input pixel of the input image to a transformed input pixel ... *and creating the output image based on the transformed input pixels of the input image, using (iii) hidden image pixels (iii)(a) for filling de-occluded areas of the transformed input pixels of the input image and (iii)(b) for filling at least one pixel position adjacent to the de-occluded areas of the transformed input pixels of the input image (iii)(c) to create enlarged de-occluded areas filled with pixels of the hidden image for preventing ghost line artifacts"* as specified above and as claimed in claim 1.

Thus, it is clear that none of the references provides any incentive or motivation supporting the desirability of the combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection.

In this context, the MPEP further provides at § 2143.01:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.

In the present case it is clear that the combination presented in the Office Action arises solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in either reference for the combination as applied to claim 1. Therefore, for this reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

Accordingly, claim 1 is allowable and an early formal notice thereof is requested. Claims 2-5 and 12 depend from and further limit allowable independent claim 1 and therefore are allowable as well. The 35 U.S.C. §103(a) rejection thereof has now been overcome. Withdrawal of the rejection is respectfully requested.

Claim 13 contains limitations similar to those of claim 1. Accordingly, for similar reasons as stated with respect to overcoming the rejection of claim 1, claim 13 is believed allowable and an early formal notice thereof is requested. Claim 14 depends from and further limits allowable independent claim 13 and therefore is allowable as well. The 35 U.S.C. §103(a) rejection thereof has now been overcome. Withdrawal of the rejection is respectfully requested.

Allowable Subject Matter

Claims 6-8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, set forth in the Office action and to include all of the limitations of the base claim and any intervening claims. Allowability of claims 6-8 is noted with appreciation. Claims 6-8 have been amended as discussed herein above to overcome the rejection(s) under 35 U.S.C. §112, second paragraph. However, in lieu of rewriting claims 6-8 in independent form, the same remain in dependent form. In view of the amendments to the base claim and intervening claims herein, it is now believed that claims 6-8 are in prima facie condition for allowance.

Claims 9-11 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Allowability of claims 9-11 is noted with appreciation. However, in lieu of rewriting claims 9-11 in independent form, the same remain as previously presented. In view of the amendments to the base claim and intervening claims herein, it is now believed that claims 9-11 are in prima facie condition for allowance.

New Claims 15-16

New claims 15 and 16 have been added to provide more complete claim

coverage of the embodiments of the present application. Claim 15 and 16 depend from and further limits independent claim 1 and therefore are allowable as well.

Conclusion

Except as indicated herein, the claims were not amended in order to address issues of patentability and Applicants respectfully reserve all rights they may have under the Doctrine of Equivalents. Applicants furthermore reserve their right to reintroduce subject matter deleted herein at a later time during the prosecution of this application or a continuation application.

It is clear from all of the foregoing that independent claims 1 and 13 are in condition for allowance. Claims 2-12 and 15-16 depend from and further limit claim 1 and therefore are allowable as well. Claim 14 depends from and further limits claim 13 and therefore allowable as well.

The amendments herein are fully supported by the original specification and drawings; therefore, no new matter is introduced. An early formal notice of allowance of claims 1-16 is requested.

Respectfully submitted,

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